Fresenius Environmental Bulletin 2014 vol.23 N11, pages 2778-2784

Biological and agrochemical properties of soils on uncultivated slopes

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Abstract

Agrochemical (organic carbon and total nitrogen content) and biological (microbial biomass, respiration, urease, dehydrogenase and cellulose activities) parameters of soil samples from five uncultivated slopes with an incline of 10-15° were estimated. The sampling points were located in the watershed area, at the foot of the slope and in between, along transect. The organic carbon content in samples taken on watershed ranged between 3.1 and 5.6%. Only for one of the slopes was a decrease of Corg content along the slope transect observed. The content of total nitrogen in samples taken on watershed ranged between 0.17 and 0.29%. Microbial respiration in watershed ranged from 27.6 to 164.2 CO2-C $g^{-1}24h^{-1}$. In the same samples, the level of microbial biomass ranged between 93.2 and 413.6 µg kg^{-1}, and dehydrogenase activity was approximately equal in all the samples (4.8-7.1 mg l^{-1} sodium resazourine salt 24 h^{-1}); levels of urease activity ranged from 0.7 to 7.6 g $NH4^{+}$ kg^{-1}, and cellulase activity from 0.8 to 8.1 g C6H12O6 kg^{-1}. Values of agrochemical and biological parameters in the soils sampled along transects fluctuated significantly, but no trends were observed. To analyze the contradictory data obtained, cluster analysis was used. It was shown that differences in the characteristics of samples from different slopes are more significant than differences in the characteristics inside the same slope. The agrochemical parameters and biological activity of soils located on slopes have the same values as those of similar types of soils located on a flat terrain and do not depend on the location or on slope profile.

Keywords

Cluster analysis, Corg Ntotal, Enzyme activity, Microbial biomass and respirations, Slopes